P12/05 Titre : Macrofauna communities as a soil quality indicator in cocoa-based agroforests and primary forest parches of Talamanca, Costa Rica

Olivier Deheuvels - Guillaume Xavier-Rousseau - Eduardo Somarriba - Ignacio Rodriguez arias

Soil quality is a concept often considered as non-objective because no absolute reference to an optimal quality can be identified. This is a consequence of the extreme variability of soils and the difficulty to link soil attributes to sustainability. Consequently some authors claim that soil quality cannot be measured but only management practices should be compared to determine which one enhanced some particular soil attribute at stake. Most studies on soil quality use clear factors or typologies to select the indicators that best explain the differences between soils. Our strategy was different : i) we defined an "objective" data set of soil quality indicators, based on literature. This first step was achieved by selecting "objective" non biotic soil indicators from recent reviews. The most actualized set of indicators available was selected out of 53 publications that provided 95 indicators. These indicators were listed, pooled when closely related and classified according to their frequency, reducing their number to 86; ii) we compared this set to the 25 soil attributes available from 36 cocoa-based AFS sampled in the Bribri indigenous reserve of Talamanca (Costa Rica), in order to select a minimum "objective" data set (MDS); and iii) we assessed correlations between soil macrofauna functional groups and the MDS. We selected 36 cocoa fields maximizing diversity based on landscape topography and fragmentation, on-plot vegetation and management intensity. Plots of 50x20m were installed at the centre of each field. Soil and litter were sampled separately on 5 locations in each plot. Macrofauna was hand-sorted immediately after sampling. Functional groups were sorted, identified and counted in laboratory. Soil was sampled within 2m from the macrofauna sampling point at depths of 0-10 and 10-20 cm and analyzed for: Bulk Density (BD), Water Content, Texture, pH, P, K, Mn, Cu, Zn, Fe, Acidity, Total C and N. WFPS, Porosity, CEC and Sum of Bases were calculated. The MDS was: BD, pH, Sum of Bases and C, and explained 62.5% of the variability of the other 21 indicators. The MDS separated cocoa plots into five soil quality groups. Forest fragments entered the first two groups indicating that cocoa AFS can conserve forest soil quality. Twelve macrofauna functional groups explained 71% of the MDS thus confirming the importance of macrofauna in soil formation and conservation. This suggests that a small number of selected indicators could be retained for monitoring purposes in Talamanca cocoa AFS.

Olivier Deheuvels - CIRAD / UMR System (66) - Montpellier / costa rica - deheuvel@catie.ac.cr